

REPORT

On contract research for

SAVANNAH ENVIRONMENTAL



SOIL INFORMATION FOR PROPOSED COOKHOUSE II WIND ENERGY FACILITY, NEAR COOKHOUSE, EASTERN CAPE

By

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DECLARATION

I hereby declare that I am qualified to compile this report as a registered Natural Scientist and that I am independent of any of the parties involved and that I have compiled an impartial report, based solely on all the information available.

A square box containing a handwritten signature in black ink. The signature is stylized and appears to be 'D G Paterson'.

D G Paterson
August 2009

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1. TERMS OF REFERENCE

The ARC-Institute for Soil, Climate and Water (ARC-ISCW) was contracted by Savannah Environmental to undertake a soil investigation between Cookhouse and Bedford, in the Eastern Cape Province. The purpose of the investigation is to contribute to the Environmental Impact assessment (EIA) process for a proposed wind energy facility. The objectives of the study are;

- To obtain all existing soil information and to produce a soil map of the specified area, as well as
- To assess broad agricultural potential.

2. SITE CHARACTERISTICS

2.1 Location

An area was investigated lying to the east of the town of Cookhouse on portions of the farms, Van Wyks Kraal 73 (Portions 0 – remaining extent, 1 and 4), Roberts Kraal 72 (Portion 0 remaining extent), Gallants Kloof 70 (Portion 3), Request 71 (Portion 0 remaining extent, Portion 11, Portion 12) and Farm 75 (Portion 2). The area lies to the east of the N10 national route and south of the R63 Cookhouse-Bedford road.

The area lies between 32° 38' and 32° 50' S and between 25° 51' and 26° 05' E. The position of the site is shown on the map in the Appendix.

2.2 Terrain

The area consists mainly of slightly undulating topography, with slopes of less than 10%. However, land type **Ib331** (see Appendix) comprises significantly steeper slopes, up to 90% or more in places. The altitude of the area is between 620 metres (close to the Great Fish River in the north) and 1017 metres (between Arolsen and Zure Kop), but the largest portion of the area lies between 700 and 800 metres above sea level.

2.3 Climate

The climate of the area has a mostly summer rainfall distribution, but the annual average is low, ranging from around 410 mm in the Fish River valley to 474 mm on the higher parts (Koch, 2003).

Temperatures for the average daily maximum and minimum range from 30.1°C and 15.3°C to 19.3°C and 5.1°C for January and July respectively.

The extreme high temperature that has been recorded is 42.5°C (presumably in "berg wind" conditions) and the extreme low -6.0°C. Frost occurs occasionally between mid-June and mid-August.

2.3 Parent Material

The area is underlain by mudstone of the Balfour Formation, Beaufort Group, with some dolerite intrusions. There is a small area of alluvium in the north (Geological Survey, 1993).

3. METHODOLOGY

Existing information was obtained from the map sheet 3224 Graaf-Reinet (Oosthuizen *et al*, 2003) from the national Land Type Survey, published at 1:250 000 scale. A land type is defined as an area with a uniform terrain type, macroclimate and broad soil pattern. The soils are classified according to MacVicar *et al* (1977).

The area under investigation is covered by seven land types, as shown on the map in the Appendix, namely:

Db166 (Non-red duplex soils)

Db167 (Non-red duplex soils)

Fc523 (Shallow soils, usually calcareous)

Fc534 (Shallow soils, usually calcareous)

Fc537 (Shallow soils, usually calcareous)

Ia119 (Deep, alluvial soils)

Ib331 (Shallow soils with much rock)

It should be clearly noted that, since the information contained in the land type survey is of a reconnaissance nature, only the general dominance of the soils in the landscape can be given, and not the actual areas of occurrence within a specific land type. Also, other soils that were not identified due to the scale of the survey may also occur.

The site was not visited during the course of this study, and so the detailed composition of the specific land types has not been ground truthed.

4. SOILS

A summary of the dominant soil characteristics of each land type is given in Table 1 below (the colours correspond to those used in the map in the Appendix).

Column 6 shows the distribution of ***dryland*** agricultural potential within the land type (see Section 5), with the dominant class shown in **bold**.

Table 1 Land types occurring (with soils in order of dominance)

Land Type	Dominant soils	Depth (mm)	Percent of land type	Characteristics	Agric. Potential (%)
Db166	Valsrivier 21/22/41/42	>1200	28%	Brown, loamy topsoils on brown to red-brown, blocky structured clay subsoils	High:14.5 Mod: 43.6 Low: 41.9
	Hutton 33/36/46	250-500	19%	Red, loamy topsoils on red, structureless, loamy subsoils on rock	
Db167	Swartland 11/21/31/41	400-700	42%	Brown, loamy topsoils on brown to red-brown, blocky structured clay subsoils on rock	High:2.8 Mod: 49.8 Low: 47.4
	Sterkspruit 13/16/26	100-300	26%	Brown, loamy topsoils on brown to red-brown, prismatic structured clay subsoils	
Fc523	Glenrosa 13/16/23	150-300	38%	Grey-brown, sandy/loamy topsoils on weathering rock	High:3.5 Mod: 12.0 Low: 84.5
	Mispah 10/20/22	50-150	16%	Grey-brown, sandy/loamy topsoils on hard rock/calcrete	
Fc534	Glenrosa 13/16/23	300-400	42%	Grey-brown, sandy/loamy topsoils on weathering rock	High:11.3 Mod: 5.3 Low: 83.4
	Swartland 11/12/21/31	300-600	17%	Brown, loamy topsoils on brown to red-brown, blocky structured clay subsoils on rock	
Fc537	Glenrosa 13/16/23	300-450	61%	Grey-brown, sandy/loamy topsoils on weathering rock	High:5.0 Mod: 5.3 Low: 88.7
	Swartland 11/21/31/42	300-600	15%	Brown, loamy topsoils on brown to red-brown, blocky structured clay subsoils on rock	
Ia119	Oakleaf 26/43/46	600-1200	43%	Brown, loamy topsoils on brown to red-brown, weakly structured alluvial loamy subsoils	High:49.5 Mod: 42.5 Low: 18.0
	Valsrivier 21/41	800-1200	13%	Brown, loamy topsoils on brown to red-brown, blocky structured clay subsoils	
Ib331	Rock	-	66%	-	High:3.0 Mod: 5.7 Low: 81.3
	Mispah 10/20/22	50-150	10%	Grey-brown, sandy/loamy topsoils on hard rock/calcrete	

5. AGRICULTURAL POTENTIAL

As can be seen from the information contained in Table 1, very little of the study area contains high potential soils. The exception is land type **Ia119**, close to the Fish River in the north, where much of these soils are irrigated.

Much of the study area consists of either:

- structured, clay soils (Swartland, Valsrivier, Sterkspruit) of low to moderate potential,
- shallow lithosols (Mispah, Glenrosa) of low potential, or
- rock.

However, the low rainfall in the area (Section 2.3) means that there is little potential for arable agriculture in the area and that the soils are suited for extensive grazing at best. The grazing capacity of the area is moderately low, around 12-18 ha/large stock unit (ARC-ISCW, 2004).

5.1 Recommendations

The prevailing potential of the soils for rain-fed cultivation throughout most of the area is low. Coupled with this is the proposed position of the wind turbines along most of the ridges where shallower rocky soils would be expected to dominant, meaning that it is very unlikely that any further, more detailed investigation will be required.

6. IMPACTS

The major impact on the natural resources of the study area would be the loss of potentially agricultural land due to the construction of the turbines and associated infrastructure. However, this impact would be of limited significance and would be local in extent, and would obviously not be sensible in the irrigated areas. However, this may well not be relevant, since sources such as Google Earth show little evidence of any irrigation within the study area. As far as any non-irrigated cultivation is concerned, the fact that the turbines will be placed far apart would mean that cultivation would still be possible between the structures.

The impact can be summarized as follows:

Table 2 Impact significance

Nature of impact	Loss of agricultural land	Land that is no longer able to be utilized due to construction of infrastructure
Extent of impact	Site only	Confined to areas within the site where turbines (15x15m), substation (80x100m), and access roads etc will be located
Duration of impact	Long-term	Will cease if operation of activity ceases
Probability of impact	Highly probable	
Severity of impact	Moderately severe	
Significance of impact	Low	Mainly due to low potential of area, as well as scattered/random nature of infrastructure which allows for almost all agricultural activities to continue on the land
Mitigation factors	The main mitigation would be to ensure that as much as possible of the planned infrastructure be confined to transformed land, or use is made of existing roads etc. In addition, the infrastructure could be dismantled at a future stage to return the environment to approximately its original state.	

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APPENDIX

MAP OF LAND TYPES

COOKHOUSE WEF: Land Types

